

# Key Technology and Application of Crankshaft Remanufacturing

Liu Mingsheng

Neijiang Vocational & Technical College, Neijiang, Sichuan, 641100, China

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Abstract: The development of green manufacturing makes remanufacturing technology more important. If crankshaft remanufacturing technology can be promoted, its utilization will be enhanced since crankshaft is an important part of engine. Crankshaft remanufacturing technology is intensively researched in recent years. The key technology of engine crankshaft remanufacturing is analyzed in this work, achieving the goal of remanufacturing through construction of evaluation system. Moreover, green manufacturing can be facilitated through remanufacturing.

## 1 INTRODUCTION

Crankshaft is an important part of engine with high loss. Abandoned crankshafts will be constantly eliminated as wastes in the use of automobile engine. However, with the development of technology and environmental protection, green manufacturing has larger developing space. Meanwhile, remanufacturing technology is applied widely. Advanced technology of surface treatment and post processing can be used on abandoned crankshafts to realize waste utilization. Therefore, crankshaft remanufacturing becomes a model of green manufacturing and makes people pay more attention to the application of remanufacturing technology. Consequently, remanufacturing technology is greatly developed, especially in process of consumable parts. The application and research on key technology of crankshaft remanufacturing are particularly analyzed in this work.

## 2 CONCEPT AND FUNCTION OF REMANUFACTURING TECHNOLOGY

With the development of science technology, reutilization of resources gradually becomes the mainstream of manufacturing. Some consumable parts can be reutilized through remanufacturing to reduce wastes. Thus, the service life of parts can be enhanced to reduce costs of production and use. Therefore, remanufacturing is a mainstream

technology worthy of studying and applying in green manufacturing and development.

### 2.1 Concept of Remanufacturing

Remanufacturing is the reprocessing of parts. Generally, manufacturing is one of the most important industries in industry. Certain fixing operation is processed on machine parts in manufacturing to lay a foundation for post processing. Therefore, remanufacturing aims at realizing the reutilization of parts through reprocessing. The generalized concept of remanufacturing is reprocessing machine parts for reutilization. However, process of different machine parts should be defined differently. For example, crankshafts remanufacturing in this work adopts reprocessing and reuse crankshafts.

### 2.2 Function of Remanufacturing

Remanufacturing is useful for many industries, especially in manufacturing and production. Some machine parts become wastes after one use, which will cause the waste of resources and increasing of costs. With the spread of environmental protection idea, advanced technology is expected to realize remanufacturing in different industries. Thus, costs can be lowered, and resources can be reused. Therefore, the function of remanufacturing can be shown in following aspects.

Firstly, resources recycle and costs control should be achieved. Recycle, a green idea for long, results from the exhausted resources. Thus, reutilization should be more emphasized in resources using.

However, reutilization is the primary stage of resources recycle. Advanced remanufacturing technology should be used to guarantee the maximum utilization of recycled resources. Moreover, remanufacturing can renew wasted products. Meanwhile, high technology can reflect the advantages of remanufacturing in wastes reutilization during the reprocessing of machine parts. In this way, the use ratio and value of recycle will be greatly enhanced. Therefore, cost control in the industry can be realized to reach the goal of low cost and high return.

Secondly, long-term development of green manufacturing should be achieved. Remanufacturing is an idea rather than a treatment technology. Green manufacturing, one of the most concerned industries at present, requires technical support to develop, where remanufacturing is an essential technology. Green manufacturing actually uses key technology to achieve the goal of resources reprocessing and reutilization. In industry and manufacturing, some machine parts with high loss cannot be used continuously after certain abrasion. Besides, metal parts can be untimely scrapped since they are easy to rust in surface. However, these abandoned parts can be reused after remanufactured, which greatly realizes the idea of environmental protection. The rise of green manufacturing requires key technology as support to realize green manufacturing system and sustainable development.

### **3 KEY TECHNOLOGY OF CRANKSHAFT REMANUFACTURING**

As an important part of engine, crankshaft is frequently changed due to its characteristic of high loss. Meanwhile, costs will be increased with the traditional way which treats abandoned crankshafts as wastes. The development of scientific technology, particularly in remanufacturing, brings great change to traditional manufacturing. The problem of cost increasing and resources wasting, caused by crankshafts with low utilization, can be solved through latest remanufacturing technology. Moreover, this technology can guarantee the normal working of disposed crankshafts. In this way, the service life of parts will increase. Thus, cost saving and resource recycle can be partly realized. Key technology of crankshaft remanufacturing can be analyzed in following parts.

Firstly, remanufacturing evaluation criterion should be made according to crankshaft's real operating requirements. Besides, matter-element

approach should be used in construction. This approach makes corresponding weight distribution, which realizes remanufacturing technology. Furthermore, the construction of remanufacturing evaluation criterion with matter-element approach is the emphasis of key technology.

Secondly, AHP based on triangular ambiguity function should be used. The use on weight distribution in each hierarchy is of vital importance in remanufacturing technology. Only normative weight distribution can guarantee the success of crankshaft remanufacturing technology. Besides, quantization treatment towards different indexes can be perfected in ways like accuracy.

Thirdly, automatic surface treatment with high precision should be realized through information sharing platform and computer control system. Surface treatment is an important step in crankshaft remanufacturing technology. Above all, matter-element approach should be used to build evaluation system. Then AHP based on triangular ambiguity function should also be applied to weight distribution in each hierarchy. Finally, with the application of automatic computer operating system, disposed parts can meet expected requirements.

In short, the emphasis in research of crankshaft remanufacturing technology is to better apply matter-element approach and AHP based on triangular ambiguity function. Then with the accession of automatic computer operating technology, the key technology of crankshaft remanufacturing can be realized. Therefore, expected result can be achieved to promote the development of green manufacturing.

### **4 APPLICATION OF CRANKSHAFT REMANUFACTURING TECHNOLOGY**

Automobile engine is a precision part, where crankshaft is one of the most important parts in it. To guarantee the normal running of cars, accidents caused by engine should be avoided. Therefore, crankshaft plays an important role. In above researches, an evaluation system for remanufacturing technology has been built. However, what is the application of crankshaft remanufacturing? What is the effect of these applications?

#### **4.1 Application Range of Crankshaft Remanufacturing Technology**

Crankshaft remanufacturing technology is more applied into the reprocessing of crankshafts.

Advanced technology is used on crankshaft surface process and post polishing. Thus, can this technology be applied in other fields? Does it have same effect and advantage when applied in other fields?

Firstly, the key technology of crankshaft remanufacturing mainly includes precision process and surface treatment of machine parts. If recycle can be realized in crankshaft remanufacturing, this key technology can be applied in other fields. For example, for parts which are easy to be abraded on surface, post process can be realized if their sizes can be reduced. Thus, the key technology of crankshaft remanufacturing can be applied in reprocessing of parts with surface abrasion.

Secondly, crankshaft remanufacturing is actually a renovating technology because some parts only abrade surface without affecting inside. Therefore, crankshaft remanufacturing technology can be used to renovate some parts. In fact, eliminated parts can have new effect if their surface rusting is removed and polished through remanufacturing technology. Therefore, the key technology of crankshaft remanufacturing can be applied in renovating fields.

Finally, the technical theory of crankshaft remanufacturing is a technology of wastes recycling. The technical theory can be used in the reprocessing of other eliminated parts. Meanwhile, the key technology of crankshaft remanufacturing can be used to realize the process of polish, renovating and reprocessing. In many circumstances, parts should be evaluated and processed on labels and specifications according to evaluation system. Thus remanufacturing technology can be truly achieved.

#### 4.2 Effect of Crankshaft Remanufacturing Technology

The key technology of crankshaft remanufacturing has great effect on its technical theory and application range. This technology can be applied to reprocessing engine crankshafts and other similar parts. Thus, wastes recycle can be realized. However, how do we evaluate the actual effect of crankshaft remanufacturing technology?

Firstly, the most remarkable effect of crankshaft remanufacturing technology is the recycle of parts. Generally, recycle and utilization are different ideas. The reprocessing idea of crankshaft remanufacturing technology realizes the reuse of abandoned parts. These parts can be utilized twice after reprocessed and polished by advanced reprocessing technology. Thus, cost is controlled and resource waste is reduced.

Secondly, the application effect of crankshaft remanufacturing technology can maximize its support for green manufacturing. With the spread of

environmental protection idea, people pay more attention to the development of green manufacturing. The core idea of green manufacturing is energy conservation and waste avoiding. If the key technology of crankshaft remanufacturing works, green manufacturing will be greatly promoted. This technology can recycle and reuse wastes on their original position, which greatly realizes the comprehensive development of green manufacturing.

## 5 CONCLUSIONS

In this work, remanufacturing application ideas and effects are analyzed. Besides, remanufacturing technology on the background of energy conservation and environmental protection can solve the problem of resource recycle. The characteristic and application skills are emphasized in the analysis of remanufacturing technology. Thus, the key technology can be used to realize the recycle of abandoned crankshafts. As one of the most common parts in engine, crankshaft has a high probability of loss because of its high frequency of using. In the process of remanufacturing, the expected effect should be confirmed, and the final evaluation should be made according to the actual effect. In conclusion, the application of remanufacturing key technology plays an important role in crankshaft remanufacturing. Besides, it lays a certain foundation for the development of green industry.

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